

LESSON 1

Copper: A Marvelous Metal

Objectives

1. Students are able to explain practical properties of copper.
2. Students are able to explain artistic properties of copper.

Arizona Visual Arts Standards

- EVALUATE: Materials, Tools, and Techniques: PO 101: Describe the visual effects created by an artist's use of tools, materials, and techniques in an artwork.
- EVALUATE: Materials, Tools, and Techniques: PO 201 & 201: Explain (and analyze) how an artist's use of tools, materials, and techniques affect an artwork's meaning, purpose, and value.

Common Core Standards

- ELA-Literacy.RST.6-8.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6–8 texts and topics*.
- ELA-Literacy.RST.9-10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

Preparation

Preview *Copper: A Marvelous Metal PowerPoint* and *Juried Biennial: Copper Exhibition Preview PowerPoint*. If you think a shorter presentation would be more effective with your students consider whether you want to start with slide #9.

Assemble any available copper items, such as a copper pot, a piece of electrical wire with insulation pulled back, a scrap piece of copper pipe or pennies prior to 1983 (after which pennies have been made from copper plated zinc). Also assemble everyday materials that can serve both practical and artistic purposes, for example a sheet of unlined paper, a scrap of wooden board, a small paint brush, etc.

Resources

- [Copper: A Marvelous Metal PowerPoint](#)
- [Juried Biennial: Copper Exhibition Preview PowerPoint](#)
- Sample copper items, such as a copper pot, a piece of electrical wire with insulation pulled back, a scrap piece of copper pipe, or pennies prior to 1983 (after which pennies have been made from copper plated zinc).
- Materials with many uses, such as a sheet of unlined paper, a scrap of wooden board, a paint brush, etc.
- [Copper: A Marvelous Metal T-Chart Worksheet PDF](#)

OPTIONAL

- drawing paper, crayons, chalks, pastels or colored pencils

Activities

Unit Preview:

- Introduce the theme in life, that "All of us have our own ideas about who and what is valuable in our lives" by asking students to write a list of some of the people, place, things, and ideas they value most.
- Introduce the theme in art "Artworks can be expressions of the values of an individual or a culture, or an era" by explaining that in Lesson Three: A Penny for Your Thoughts, students will design a penny to show something they value.

Introduce the key questions students will be working with in the unit:

1. How are elements organized within a circular format?
How can I organize elements within a circle?
 2. What subtle variations of color do I see?
How can I use subtle variations of color in my artwork?
 3. How can I express an important value in my artwork?
What does this artwork say about value?
- Pass around samples of ordinary materials, such as a scrap of wood, a sheet of blank paper, or a paint brush. Ask students to list practical uses for each. Then ask them to list ways an artist might use each.
 - Explain that students will consider how copper is valuable both for its practical and artistic uses in Lesson One.
 - In Lesson Three: A Penny for Your Thoughts, they will continue to think about what makes something valuable, and will design a penny in a circular format using subtle copper colors.

Distribute *Copper: A Marvelous Metal T-Chart Worksheet*. As the presentation introduces each of four qualities of copper, remind students to think about practical and artistic values of copper.

- Assessment: After each quality is presented ask students to fill in the appropriate section of the T-Chart with examples from the presentation or maybe some new ideas of their own.

Arizona History and Culture: Show *Copper: A Marvelous Metal PowerPoint*, slides 1-8:

- Slides 1-5 explain what copper is.
- Slides 6-8 show examples of how artists have used copper in artworks inspired by its role in the history and culture of Arizona.

Ancient History: Show *Copper: A Marvelous Metal PowerPoint*, slides 9 and 10:

- Slide 9 explains the important role copper played in ancient times as a transition between the stone age and the bronze age.
- Slide 10 shows the work of an artist who uses ancient metals.

Definition and Guided Practice: Show *Copper: A Marvelous Metal PowerPoint*, slides 11-16 starting with "malleability":

- Slide 11 lists four qualities of copper.
- Slide 12 defines "malleability."
- Slides 13-14 explains the malleability of copper.
- Slide 15 shows how an artist used the malleability of copper in her work.
- Slide 16 shows bronze (and alloy of copper and tin) and explains that it is not malleable.

Definition and Guided Practice: Show *Copper: A Marvelous Metal PowerPoint*, slides 17-21 focus on "ductility."

- Slide 17 defines "ductility."

- Slide 18 and 20 show examples of how copper sheets and wire can be used.
- Slide 21 shows examples of artworks that use copper sheets and wire

Definitions and Guided Practice: Show *Copper: A Marvelous Metal* PowerPoint, slides 22-25 focusing on copper as a "conductor" of heat and electricity:

- Slide 22 defines how copper is a "conductor" of heat and shows copper objects that use that conductivity.
- Slides 23-24 show how copper is a "conductor" of electricity and examples that use that conductivity.
- Slide 25 shows how an artist incorporated an actual copper circuit board into her work.

Definitions and Guided Practice: Show *Copper: A Marvelous Metal* PowerPoint, slides 26-30 focusing on the range of colors it produces:

- Slide 26 defines "tarnish" with examples.
- Slide 27 shows seven years of tarnish on the exterior of the TCA.
- Slide 28 defines and shows examples of "patina."
- Slide 29 shows stones whose green or bluish-green color comes from copper.
- Slide 30 shows how three artists use copper's diverse colors in their work.

Transfer to TCA: Slide 31 is an invitation to the *Juried Biennial: Copper* exhibition at the Tempe Center for the Arts with sample artworks from the exhibition that use or are inspired by copper.

NOTE: Many of the works in the exhibition are also viewable on the Biennial Copper exhibition preview PowerPoint.

Vocabulary

- copper
- cast
- industrial
- ore
- malleable
- element
- sulfuric acid
- ductile
- tarnish
- underground mine
- conductor
- oxygen
- open-pit mine
- mold
- interaction
- Stone Age
- alloy
- carbon dioxide
- Bronze Age
- extrude
- patina
- Iron Age
- insulation
- palette
- smelt
- cable

- brooch
- bronze
- volt
- millennia
- circuit board

Extension Activities

ART:

- Distribute drawing paper and crayons, chalks, pastels, or colored pencils.
- Direct students to fold their paper in half three times, so that when unfolded the folds define eight rectangles.
- Review the Copper: A Marvelous Metal PowerPoint. Stop at selected slides and ask students to reproduce the color/s of copper they see in different rectangles as best they can.
- Preselect slides you will ask students to observe carefully as they attempt to recreate the colors. Some slides provide more than one example.
- Explain that this color observation will help students practice creating copper colors they will be using when they design their penny in Lesson Three: A Penny for Your Thoughts.

SCIENCE:

- Consider collaborating with a science teacher to introduce the Periodic Table of Elements, locating copper on the table, using its chemical abbreviation (CU) and identifying its chemical characteristics.

Assessment Checklist

OBJECTIVE 1: Students are able to explain practical properties of copper.
(Completion of left column of *Copper: A Marvelous Metal T-Chart*)

OBJECTIVE 2: Students are able to explain artistic properties of copper.
(Completion of right column of *Copper: A Marvelous Metal T-Chart*)